

Seed System Innovations in the Semi-Arid Tropics of Andhra Pradesh



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Abstract

An effective seed supply system is necessary to make good quality seed available to farmers at the right time and at low cost. Given the critical role played by improved varieties in increasing production of grain and quantity and quality of stover for livestock fodder in conventional cropping systems, agriculture decision-makers have the challenge of developing an integrated and cost-effective seed system that is capable of generating and delivering improved seed varieties to farmers. Such a system would be an important step toward ensuring seed security and enhancing livelihoods, particularly of dryland farmers.

Issues related to seed multiplication and delivery systems in India are discussed in this publication. The book outlines the development of the seed industry in India and highlights the changes made to seed policies over the years. It records the experience from an attempt to improve the local seed systems in four dryland agricultural districts that are typically representative of the semi-arid areas of Andhra Pradesh state. Using specific seed delivery models, it presents ways of strengthening seed systems to address the needs and vulnerabilities of smallholder farmers including those associated with livestock and fodder security in these areas.

This book is not an all-encompassing summary of the seed systems in Andhra Pradesh, nor does it try to provide magical solutions to constraints encountered by poor farmers. It does, however, attempt to illustrate alternative approaches to strengthen the seed systems by employing new approaches as well as implementing tested approaches in new ways constituting innovation. Given the ever rapid changes taking place in the technological, socioeconomic and policy environments, understanding some of the processes and mechanisms involved in these changes as has been presented in this document will help in continuous development of an appropriate seed system and contribute to enhancing the livelihoods of poor farmers in the semi-arid areas of India.

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Foreword

The power of a seed is unlimited. As a powerful agent of change, seeds can be a means of overcoming production constraints, thereby making a difference in the lives of the poor and hungry. This requires seed demand and supply to be balanced by way of a secure seed supply system. This would give farmers access to adequate quantities of good quality seed of the desired type at the required time and at affordable cost.

Seeds are key components in the conservation and ownership of biodiversity. Accordingly, sustainable seed supply and implementation of seed security are among the major activities outlined in the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Seeds therefore represent hope for the future of mankind.

Throughout our history, farmers' informal seed systems have had a great influence on the evolution of modern agriculture, by practising conservation of agrobiodiversity at the gene, farmer and ecosystem levels. Within this framework, women in particular have played a crucial role, as has been identified by a recent analysis, in sustaining the informal seed sector, and more widely, in ensuring food security. However, informal seed systems are heavily dependent on local resources and inputs, and highly vulnerable to natural disasters and sociopolitical disruptions. Therefore, investing in a range of approaches in order to strengthen local seed systems assumes great urgency.

While the formal hybrid seed industry led by the private sector has tended to focus on profit-making species and crops, the informal sector has concentrated on crops – mainly self- or open-pollinated varieties – that are crucial to local food production systems. Given such a scenario, national seed policies concludes helping to strengthen the informal sector. International support too continues to be mainly engaged with the formal sector. Perhaps matching support is required to encourage continued development of informal seed systems.

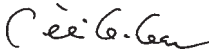
In this context, the concept of 'seed villages', which advocates self-sufficiency in production and distribution of good quality seed, is fast gaining ground. Seed villages, or village seed banks, operate under supervision and utmost transparency, inculcating mutual trust and social responsibility among farmers, thereby reducing their dependence on external inputs.

Several initiatives have been launched to revive this traditional concept, such as those initiated by the Indian Council of Agricultural Research (ICAR), the National Research Centre for Sorghum (NRCS) and state agricultural universities (SAUs). Similarly, the seed bank concept is part of ICRISAT's projects in collaboration with the Asian Development Bank (ADB), Tata-ICRISAT project in Vidisha and Guna districts of Madhya Pradesh and the Andhra Pradesh Rural Livelihoods Project (APRLP) in Kurnool district in Andhra Pradesh and other ongoing efforts in the states of Maharashtra and Karnataka.

In low-rainfall, dryland agricultural areas, cereals and legumes serve the dual purpose of providing food and income for poor farmers and fodder for their cattle. Given the critical role played by improved varieties in increasing conventional crop production, a key question arises: how do we facilitate the development of an integrated and cost-effective seed system that is capable of generating, producing and distributing improved seed varieties that meet the needs of resource-poor farmers?

This book is an attempt to review and document the existing seed multiplication and delivery systems in four dryland agricultural districts of Andhra Pradesh: Anantapur, Kurnool, Mahbubnagar and Nalgonda. While analyzing the problems associated with different seed systems in these districts, the book makes a strong case for strengthening alternative seed systems and seed delivery models that address the needs of small farmers in the context of constantly changing dynamics on the national, international, political and socioeconomic fronts.

I am sure this book will be a valuable reference source for those engaged in strengthening local seed systems as a step toward food security in the semi-arid tropics of India.


William D Dar
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Part I: Introduction

CHAPTER 1: Preamble-The Need for Change

The Need for Change

A little-known, under-appreciated and pressing concern in the global supply of crop seed is a dearth of systems providing seed for crops of import mainly to poor households in developing countries. Seed for such crops cannot be supplied economically by the formal and centralized seed sector. The resulting bottleneck in seed supply primarily affects self-pollinating crops, such as groundnut, chickpea, pigeon pea, black gram, and green gram which are served largely, if largely ineffectively, by local seed provision systems. This chapter touches on the interfaces between crop and livestock production systems and provision of seed and feed in a developing-country context, where smallholder mixed crop-and-livestock farming remains the backbone of agricultural enterprise and such interfaces are common. We look at this crop-livestock-seed-feed 'quadrangle' under Indian circumstances and scenarios, particularly the barriers and socioeconomic constraints relating to improved seed dissemination on the sub-continent and interventions most likely to improve seed supply by, among and to the poor.

Introduction

Whereas the formal seed sector dominates supply of seed to farmers in industrialized countries, the informal sector is the main actor in developing countries, where despite large investments over the past three decades to build formal seed systems, 90–95% of the world's smallholder farmers still obtain seed from informal sources, largely from other farmers. The formal seed sector of developing countries is controlled either by the state or private industry, which monitors the entire process of seed production—from breeding to multiplication to processing to storage—to ensure high-quality. In the informal sector, on the other hand, seed may be manually cleaned but is otherwise generally left untreated, which exposes the resulting crop to the risk of seed-borne pests.

The reason almost all smallholder farmers continue to take recourse in farmer-obtained seed (including their own) is not only because of their inadequate access to the formal sector (and to the credit systems that would allow them to exploit it) but also because the few cultivars and varieties on offer in the formal seed sector do not meet their needs. The informal sector provides a dynamic and flexible supply of seed wanted by smallholder farmers. Furthermore, on-farm production of locally adapted landraces, cultivars and wild species helps farmers cope with specific tropical production problems caused by drought, flooding, heat, cold, pests and diseases.

The repeated use of untested seed by smallholders, however, can lead to seed degeneration. And the risk of transmitting disease through seed is real, if usually ignored, while disease control measures are often unknown by smallholders, unavailable to them, or inadequate for their needs. The common result of hundreds of millions of farmers repeatedly sourcing seed informally is inferior seed quality, dissemination and build-up of seed-borne diseases, and crop yields far below their potential.

What would help these smallholder farmers is to know the quality of seed before they buy and sow it. Knowledge of which supplies of seeds are healthy would allow farmers to choose seed that could increase their crop yields significantly. Although smallholders often inspect seed before purchasing it from a neighbouring farmer or the local market, the health and quality of seed is not always apparent to the naked eye. Seed supply from both formal and informal systems suffers from these and other problems caused largely by lack of investments in education, research and quality control programs.

The 'crop-livestock-seed-feed quadrangle' in an Indian scenario

Every country needs a robust seed supply to sustain its agriculture and to ensure that the products of modern plant breeding, as well as local farmer ingenuity, are widely available. A commercial seed sector is needed to ensure an efficient and healthy national seed supply. Compared to other developing nations, India has well-developed seed supply systems in both the public and private sectors; hence, the possibilities of delivering plant-breeding innovations to smallholder farmers are better here than in many other developing countries. But even in India's relatively mature seed supply systems, information moves slowly between smallholders and seed

providers, and much of the information is incorrect, incomplete or inadequate for farmers and suppliers alike. Large opportunities exist to improve this information flow as well as farmer access to reliable supplies of good-quality seed of improved varieties at prices affordable by resource-poor cultivators.

In the traditional farming communities of India, the richer or more successful farmers tend to make themselves 'seed-secure' simply by maintaining their own stocks, while poorer farmers need to buy or borrow seed every year. The influx of new varieties is limited to various degrees in these traditional communities, and systems for raising awareness of variety selection are typically either poorly developed or lacking entirely. Varieties grown in traditional communities are limited because the genetic material grown on one farm is typically available on neighbouring plots (farmers who obtain material from their neighbours obviate both the risk and cost of procuring seed from formal sources). In addition, those farmers who source their seed from other cultivators often obtain it from just a few farmers identified by the community as reliable sources of good-quality seed. It has not yet been established if most of these few local seed suppliers adopt special practices to produce high-quality seed or if they are simply well-endowed farmers with surplus grain to sell as seed.

India's smallholder rain-fed farmers experience erratic rainfall and recurring droughts, which lower their incomes as well as grain yields. But fodder crops are less susceptible to drought than grain crops; indeed, some fodder plants can be harvested for fodder even in years when grain production fails entirely. This drought-hardiness trait of many fodder plants influences which crops and varieties farmers choose to grow. The only crop options for many small-scale rain-fed farmers in the semi-arid tropics of Andhra Pradesh, India are sorghum and pearl millet intercropped with pigeon pea, groundnut and chickpea in dryer Rabi season. In recent years, sorghum and pearl millet are increasingly grown in marginal farming areas where other crop options are severely limited. The steep decline in acreage planted to these crops puts both human and livestock nutrition at risk since sorghum and millet feed both people (the grain) and livestock (the stover). In many regions, dry stover from these crops is the only feed available to animals over the long months of the dry season.

Barriers to seed security

The barriers to development of community-based seed production systems include the generally poor roads and related infrastructure in India's rural hinterlands, which constrain the distribution of seed along with other farm inputs and produce. Farmers need a broad range of modern varieties to choose from, detailed information on those varieties, and training to help them produce seed efficiently themselves with modern technologies. Linking small-scale farmers to institutions offering credit would support the more than 60% of Indian farmers who purchase seed. An inventory of varietal traits would be useful to many farmers, as would production of varieties with preferred traits for their evaluation and selection. Also needed is production of Breeder seed (produced in the first generation by the plant breeder) and Foundation seed (the next step to increasing the amount of seed) of newly released varieties and those in advanced stages of testing. This is then followed by production of Certified seed which is usually monitored by a government agency for quality, and is then sold commercially and purchased by farmers. Field days demonstrating to local communities the utility of certain varieties grown under certain production systems and circumstances would help widen use of improved varieties. Those improved varieties adopted by communities should be monitored to assess their effectiveness and, later, to determine the factors constraining their broad adoption.

None of the above diminishes the importance of traditional coping strategies based on local ways of exchanging seed. Any intervention aimed at increasing the resilience of India's seed distribution systems should take into account traditional seed exchange practices. For example, rather than focusing solely on getting more improved seed to more local communities, local seed exchange networks could also be enhanced by increasing local production and multiplication of seeds and by facilitating farmer access to formal as well as informal seed supply systems. Key to all these strategies is providing small-scale farmers with greater access to credit and other support systems.

Interventions needed

Although the type and success of any intervention will depend very much on the context within which it is implemented – bio-physical suitability, present institutional arrangements and related policies - the following have

been identified as possible intervention strategies that would help provide India's smallholder farmers with the best quality seed at the right time, place and price.

- Implementing Farmer seed self-reliance programs through community or village seed bank program or 'Beej Swavlamban Yojana' facilitating decentralized seed production and distribution system.
- Developing contractual agreements with farmers to grow seed and establishment of parastatal seed cooperatives.
- Improving supplies of seed for forages, medicinal plants, flowers and underused crops that could benefit resource-poor farmers.
- Promoting community-based evaluation, characterization and multiplication of "at-risk" varieties. Collection and characterization of indigenous grain varieties and establishment of *in situ* seed conservation centres to reduce the risk of local varieties disappearing.
- Building capacity of self-help groups to facilitate community seed banks and provide incentives for farmers to grow indigenous varieties and seed conservation efforts.
- Facilitating community-devised and generated marketing and credit support systems.
- Introduction of controlled conditions to effectively produce nuclei seed; facilities for seed storage, processing, and packaging and establishment of public-private sector partnerships for seed distribution.
- Practicing of Farmer participatory varietal selection, seed production and monitoring. On-farm demonstration trials, on-station seed selection, and distribution of seed to private suppliers.
- Continual identification of opportunities for mutual learning by farmers and scientists to help improve the effectiveness of seed supply to local communities.
- Designing, developing and testing site specific alternative seed system models for improving and sustaining local seed supply based on geographic and ethnic as well as administrative boundaries.
- Taking into consideration and utilizing aspects of the lesser known traditional seed management systems.



About ICRISAT®



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a nonprofit, non-political organization that does innovative agricultural research and capacity building for sustainable development with a wide array of partners across the globe. ICRISAT's mission is to help empower 600 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture. ICRISAT belongs to the Alliance of Future Harvest Centers of the Consultative Group on International Agricultural Research (CGIAR).

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